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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,620	11/18/2003	Gyana Ranjan Parija	00280747AA	3263

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EXAMINER	
FLEISCHER, MARK A	
ART UNIT	PAPER NUMBER
3623	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/714,620	PARIJA ET AL.	
	Examiner	Art Unit	
	MARK A. FLEISCHER	3623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 March 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Examiner's Note: This Non-Final Office action is presented following Applicant's preliminary amendments filed on 21 March 2008. Due to a clerical error, an earlier Non-Final Office Action was filed but not mailed until after the preliminary amendments were filed. Consequently, this Non-Final Office Action addresses the amended claim set as set forth in the preliminary amendments filed 21 March 2008.

Status of Claims

1. This action is in reply to the Application filed on 18 November 2003 and the Preliminary Amendments to the specification and claims filed 21 March 2008 and 11 June 2008.
2. Claims 1–14 have been canceled.
3. Claim 15 has been added.
4. Claim 15 is currently pending and has been examined.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 15 recites the limitation "*for each back-to-back class*". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 101

7. 35 U.S.C. §101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

8. Claims 15 is rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. Based on Supreme Court precedent, and recent Federal Circuit decisions, the Office's guidance to examiners is that a §101 process must (1) be tied to another statutory class (such as a particular apparatus) or (2) transform underlying subject matter (such as an article or materials) to a different state or thing. *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780,787-88 (1876). An example of a method claim that would not qualify as a statutory process would be a claim that recited purely mental steps. Thus, to qualify as a §101 statutory process, the claim should positively recite the other statutory class (the thing or product) to which it is tied, for example by identifying the apparatus that accomplishes the method steps, or positively recite the subject matter that is being transformed, for example by identifying the material that is being changed to a different state. Examiner notes that many of the limitations in these claims appear to constitute method steps which, when tied to another statutory category as stated above, could render them to be within the statutory framework.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Parija, *et. al* (*On Bridging the Gap Between Stochastic Integer Programming and MIP Solver Technologies*- 2002) in view of Sandhu (*Automating Class Schedule Generation in the Context of a*

University Timetabling Information System-2001) and further in view of Johnson (*A Database Approach to Course Timetabling*-1993).

Claims 15:

Parija, as shown, describes and/or discloses the following limitations.

- *A stochastic integer programming based constrained optimization method* (Parija, in at least the title and abstract refers generally to "stochastic integer programming". Parija, on page 4, describes the components of the constraints associated with the problem formulation)
- *generating a revenue/profit optimization model of overall operational revenue/profit under the different planning scenarios by location city* (Parija on page 3 refers to "stochastic optimization modeling/solver software…" (emphasis added) hence corresponds to *generating a revenue/profit optimization model*. Note however, that, as stated above, Sandhu on page 19 refers to "maximizing profits". On page 4 Parija states: "The algorithm can be implemented within […] any commercial solver that has the necessary infrastructure for modeling a scenario tree." (emphasis added) hence corresponds to *different planning scenarios*.)
- *inputting a list of classes by location city,* (Parija, on page 2 observes that "Such stochastic integer programming (SIP) problems arise, for example, in […] location [type problems…]" hence corresponds to by location city.)
- *solving a stochastic program of a revenue/profit optimization model by solving its deterministic equivalent* (Parija, on page 1 states: "In a typical setting, the uncertainty is resolved by specifying a set of scenarios and the problem is reduced to deterministic, albeit large-scale, mathematical program – known as the deterministic equivalent." (emphasis added) where the correspondence is obvious.)*;*

Parija, does not specifically teach the following limitations, but Sandhu, in an analogous art, does, as shown.

- *revenue/profit optimization model* (Sandhu on page 19 refers to "maximizing profits").

- *for allocation of classrooms* (Sandhu, on page 53 near the bottom of the page, refers to "room allocation algorithms") *and instructors* (Sandhu, on page 59 near the top of the page states: "[…] scheduled over 2000 students and instructors […]" (emphasis added) and on page 69 generally refers to "person assigned" which corresponds to the allocation of an *instructor*) *to requested classes* (Sandhu, on page 50 states: "The students were allowed to express preferences for combinations of courses rather than for a single course." (emphasis added) hence, corresponds to *requested classes*) *associated with cancellation probabilities* (Sandhu on page 96 states: "This issue […] takes into consideration all the historical data in regards to timetable classes and generates results considering the percentage of possible clashes." (emphasis added) where the 'historical data' is used to determine 'the percentage of …clashes' hence corresponds to *cancellation* probabilities. Also, on page 84, Sandhu states: "[A] system was derived whereby solutions could be weighted […] so that the probability of a clash could be reduced." (emphasis added) where 'weighted' and 'probability of a clash' also corresponds to *cancellation probabilities.*) *and comprising the steps of:*
- *inputting a list of classes by location city, preferred time window, their cancellation probabilities and available classrooms and instructors* (Sandhu, on page 82 refers to "a list of potential room-time slot allocations available to each entry in the teaching slot table" (emphasis added) and on page 94 describes data pertaining to "classes available", hence corresponds to *a list of classes, classrooms and instructors*. As noted above, Sandhu page 96 refers to equivalents to *cancellation probabilities*. Also, Sandhu on page 169 states: "[C]omplete data profiling [of] the overall university structure [includes] the following: Campuses – all campuses would be entered to ensure the system could support a multi campus set up" (emphasis added) where 'data profiling' corresponds to *a list of classes by location city* and the 'multi campus set up' corresponds to *location city*. Sandhu, on page 42, refers to "particular time

slots […] that were requested by students." (emphasis added) hence corresponds to *preferred time windows*. Sandhu on page 96 states: "This issue […] takes into consideration all the historical data in regards to timetable classes and generates results considering the percentage of possible clashes." (emphasis added) where the 'historical data' is used to determine 'the percentage of …clashes' hence also corresponds to *cancellation* probabilities. Also, on page 84 Sandhu states: "[A] system was derived whereby solutions could be weighted […] so that the probability of a clash could be reduced." (emphasis added) where 'weighted' and 'probability of a clash' further corresponds to *cancellation probabilities.*);

- *analyzing operational revenue/profit under different planning scenarios involving chaining of various classes, prerequisite relationships, and inter-class spacing requirements* (Sandhu on page 19 refers to "the objective of meeting a desired goal such as maximizing profits […]" (emphasis added) corresponding to *analyzing operational revenue/profit* and on page 10 states: "[I]n practical terms the timetabling problem can be described as scheduling a sequence of lectures between teachers and students in a prefixed time period […] satisfying a set of varying constraints [ ]" (emphasis added) where the 'sequence' corresponds to *chaining of various classes* and the 'varying constraints' corresponds to the *prerequisite relationships, and inter-class spacing requirements.*); *and*
- *outputting a list of classes scheduled by curriculum identification (ID), corresponding start date, allocated classrooms, location city, allocated instructor, and expected revenue* (Sandhu, on page 81 notes: "The outputs of the system are the various management and timetabling reports." (emphasis added) where these reports correspond to *expected revenue*. Sandhu on page 172 further notes "…all combinations of classes to rooms was generated, counted and checked…" and describes outputs of (page 98) "room availabilities", "room teaching usage", "subject class timetable" and "*Staff* as they are allocated rooms" and which correspond to the

classroom, curriculum identification and *instructor,* respectively. Finally, Sandhu on page 169 states: "[A]ll campuses would be entered to ensure the system could support a multi-campus set up." (emphasis added) hence corresponds to *location city*.)

- *wherein said start date for each class is calculated based on lengths of each class and available time windows for each class* (Sandhu notes on page 15 that "[t]he availability of sessional lecturers … can provide an extra complexity to the timetable problem even after it has been generated." (emphasis added) where the emphasized text corresponds to *available time windows for each class* since the term 'sessional…' clearly pertains to a 'class' time slot or *time window*.)
- *wherein said allocated instructors for each class is calculated based on the available instructors with required skills during the allowable time windows for each class* (Sandhu on page 10 states: "Thus, in practical terms the timetabling problem can be described as scheduling a sequence of lectures between teachers and students in a prefixed time period […] satisfying a set of varying constraints." (emphasis added) where the 'satisfying constraints' corresponds to *instructors with required skills…* Also, on page 10, Sandhu refers to "a timetable generation system that generates valid solutions […]" (emphasis added),

Parija, *et. al* describes a general modeling approach, *Stochastic Integer Programming*, which is amenable for application to a vast array of problem domains, including that of *timetabling,* the subject of Sandhu's dissertation and the domain of the instant application. Moreover, as the instant Application involves probabilistic elements such as the stochastic demand for classes and class cancellation probabilities, the application of SIP to these types of timetabling problems specifically addresses these uncertainties. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija and Sandhu because the SIP methodology of Parija, with the definition of appropriate constraints and problem definition of Sandhu, can lead to solutions to difficult timetabling problems and is one of many

"apparently effective timetable solution generation algorithms" (Sandhu, abstract). Thus, the technical ability existed to improve solutions to such timetabling problems and would have been predictable.

Neither Parija nor Sandhu specifically describe and/or disclose the following limitation, but Johnson, as shown does.

- *and said start date for each back-to-back class is calculated based on lengths of each class and available time windows for each class* (Johnson, on page 427 states: "Not all classes last the same amount of time. […] In many situations, all classes are some multiple of the basic period, but in some cases, classes of a totally different time might have to be incorporated." (emphasis added) where 'incorporating' different time lengths corresponds to affecting the timetable, hence the *valid start dates*. Johnson further states that "Realistically, we can usually assume that there are enough teaching rooms available in total to accommodate all groups of students, but there will inevitably be problems caused by the use of specialist rooms such as laboratories or workshops." (emphasis added) where an 'available room' *ipso facto* corresponds to an *available time window*. Finally, on page 428 Johnson notes: "In addition to the actual timetables, a variety of lists and forms can be prepared for such things as: room allocations; subject teaching requirements; staff workloads; facility utilization; provided that the relevant data is captured and stored in an appropriate form." (emphasis added) where the 'timetables' specifically denotes the *valid start dates* and 'lists' corresponds to *the list*. Note, however that Sandhu shows on page 10: "[I]n practical terms the timetabling problem can be described as scheduling a sequence of lectures between teachers and students in a prefixed time period […] satisfying a set of varying constraints [ ]" (emphasis added) where the 'sequence' corresponds to *back-to-back class* and 'varying constraints' corresponds to *lengths of each class*).
- *wherein said allocated classrooms for each class is calculated based on tier codes for each class and available classrooms during the allowable time windows for each class* (Johnson, on page 427 refers to "a much more varied range of subject choices at both the BCSE and

'A' level." (emphasis added) and on page 432 further distinguishes "undergraduate level" which equate to *tier codes*. In addition, on page 429, Johnson states: "it is often necessary to use codes or initials to refer to individuals, courses or locations." (emphasis added) and goes on to describe "distinct groups of students" attending a "common course" and thus these groups denoted by codes ultimately affect the timetable.)

- *and said allocated classrooms for each back-to-back class is calculated based on lengths of each class and available time windows for each class* (Johnson, on page 427 states: "Not all classes last the same amount of time. […] In many situations, all classes are some multiple of the basic period, but in some cases, classes of a totally different time might have to be incorporated." (emphasis added) where 'incorporating' different time lengths corresponds to affecting the timetable, hence the *valid start dates*. Johnson further states that "Realistically, we can usually assume that there are enough teaching rooms available in total to accommodate all groups of students, but there will inevitably be problems caused by the use of specialist rooms such as laboratories or workshops." (emphasis added) where an 'available room' *ipso facto* corresponds to an *available time window*. Finally, on page 428 Johnson notes: "In addition to the actual timetables, a variety of lists and forms can be prepared for such things as: room allocations; subject teaching requirements; staff workloads; facility utilization; provided that the relevant data is captured and stored in an appropriate form." (emphasis added) where the 'timetables' specifically denotes the *valid start dates* and 'lists' corresponds to *the list.*),
- *and said allocated classrooms for each back-to-back class is calculated based on lengths of each class and available time windows for each class* (Johnson, on page 427 states: "Not all classes last the same amount of time. […] In many situations, all classes are some multiple of the basic period, but in some cases, classes of a totally different time might have to be incorporated." (emphasis added) where 'incorporating' different time lengths corresponds to affecting the timetable, hence the *valid start dates*. Johnson further states that "Realistically, we can usually assume that there are enough teaching rooms available in total to

accommodate all groups of students, but there will inevitably be problems caused by the use of specialist rooms such as laboratories or workshops." (emphasis added) where an 'available room' *ipso facto* corresponds to an *available time window*. Finally, on page 428 Johnson notes: "In addition to the actual timetables, a variety of lists and forms can be prepared for such things as: room allocations; subject teaching requirements; staff workloads; facility utilization; provided that the relevant data is captured and stored in an appropriate form." (emphasis added) where the 'timetables' specifically denotes the *valid start dates* and 'lists' corresponds to *the list*. Sandhu however shows on page 10 states: "[I]n practical terms the timetabling problem can be described as scheduling a sequence of lectures between teachers and students in a prefixed time period [...] satisfying a set of varying constraints [ ]" (emphasis added) where the 'sequence' corresponds to *back-to-back class* and 'varying constraints' corresponds to *lengths of each class*).

The details articulated in Johnson merely illustrate some of a wide variety of possible and typical constraints and data that are relevant to timetabling problem definitions and solutions such as, for example, the inclusion of possible *back-to-back classes*. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija/Sandhu with those of Johnson and incorporate established constraint elements into a viable system and method for solving practical, real-world timetabling problems "of a modern school or university" (Johnson, p.425), hence the technical ability existed to improve solutions to such problems and the application of SIP methods would have been predictable.

Conclusion

Any inquiry of a general nature or relating to the status of this application or concerning this communication or earlier communications from the Examiner should be directed to Dr. **Mark A. Fleischer** whose telephone number is **571.270.3925.** The Examiner can normally be reached on Monday-Friday, 9:30am-5:00pm. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, **Beth Boswell** whose telephone number is **571.272.6737** may be contacted.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://portal.uspto.gov/external/portal/pair <http://pair-direct.uspto.gov >. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866.217.9197** (toll-free).

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Mark A. Fleischer, Ph.D.
/Mark A Fleischer/
Examiner, Art Unit 3623 30 July 2008

/Beth V. Boswell/
Supervisory Patent Examiner, Art Unit 3623